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TITLE: HEAT TREATMENT AND APPARATUS THEREFOR

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INVENTOR-INFORMATION:

NAME

KANO, YASUO

USUI, SETSUO

ASSIGNEE-INFORMATION:

NAME

SONY CORP

COUNTRY

N/A

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ABSTRACT:

PURPOSE: To obtain a crystal thin film over a widened area and with excellent reproducibility, by a method wherein an object of treatment is heat-treated using an energy beam shaped by a split semicylindrical lens and a semicylindrical lens disposed so that their longitudinal axes directions cross perpendicularly to each other.

CONSTITUTION: At a focal plane fb, a laser beam having Gaussian distribution is split at the center, and the split portions overlap with each other, whereby a linear laser beam B<SB>04</SB> shown at D is obtained which has a substantially uniform energy density distribution. At a focal plane fa,

two linear laser  
beams B<SB>06</SB> are obtained which have a Gaussian  
energy density  
distribution. Between the focal planes  $f_a$  and  $f_b$ , a laser  
beam B<SB>05</SB> is  
obtained which has such a beam spot configuration that two  
cut elliptical beams  
face each other, that is, a double-humped energy density  
distribution.  
Employment of the linear laser beam B<SB>04</SB> having a  
uniform energy  
density distribution enables crystallization to be obtained  
over a widened area  
and with excellent reproducibility. When the laser beam  
having a double-humped  
energy density distribution is applied to a polycrystalline  
silicon film so as  
to be recrystallized, it is also possible to obtain a  
silicon crystal film with  
excellent crystallizability.

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